State Form 4336

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
INDIANAPOLIS

OFFICE MEMORANDUM

Date: June 19, 2015

To: Mark Jaworski
Federal Programs

Thru: Larry Studebaker, Chief
Geological Services Section

From: Sarah Finley Johanson, LPG # 2158
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Subject: Preliminary Assessment
Vermont Street Wells
Indianapolis/Speedway, Marion County
Site # 3400267 (GZ04R)

STUDY SETTING

The project area is between Little Eagle and Big Eagle Creeks on the west side of Indianapolis (Ref 3). Both streams flow generally north to south through the study area. The confluence of the two streams is about one mile southeast (Ref 3). The area of interest is a triangular parcel bounded by Vermont St on the south, Rybolt Ave on the west, and Cossell Ave on the north.

Three potentially responsible parties could have contaminated residential drinking water wells with vinyl chloride (Ref 38, pg 10). The Speedway wellfield is approximately 7200 feet northwest of the known contamination (Ref 123, pg 32). The Riverside wellfield is approximately 13,500 feet east of the known contamination (Ref 129, pg 19). Both wellfields are within the 4-mile radius specified by the hazard ranking system and are considered potential receptors. The potential sources for CVOCs in the vicinity include Allison Transmission, Genuine Parts (Former Allison Plant 10), and Michigan Plaza (Ref 38, pg 10).

LOCAL GEOLOGY

Surficial soils near the residential wells and potential sources consist of Urban Land-Genesee complex along the north bank of Little Eagle Creek and in a small area near west Vermont St in the southwest corner of the area of interest. Genesee soil consists of very deep, well drained soils that formed in flood plains along the White River and larger creeks. Urban Land- Fox complex is present through the remainder of the area of interest and in most of the land between the two creeks. Fox complex soil consists of well drained soils overlying sand and gravelly sand. (Ref 125)

The sediments beneath the residential wells, potential source areas, and Speedway and Riverside wellfields are outwash with some till caps (Ref 120, pgs 3-7). Outwash is sediment deposited by meltwater usually composed of sand and (or) gravel. Till is unsorted sediment deposited directly from glacier ice with little or no reworking by meltwater or mass movement. In the area of interest and the Speedway wellfiled, sediments consist of variable thicknesses of outwash overlying complexly interbedded sand and gravel and till. Thick unbroken sections of sand and gravel are present locally (Ref 120, pg 11). Sediments in the Riverside wellfield consist of thick sections of sand and gravel interstratified with a few, small, widely scattered till units (Ref 120, pg 11). The aquifer is unconfined and the recharge rate is high (Ref 120, pgs 12-13).

Boring logs in the project area show that unconsolidated sediments consist primarily of sand, with interbedded fine-grained units between 30 and 80 feet bgs (Ref 40, pgs 885-1113; Ref 131; Ref 132; Ref 133, pgs 446-571; Ref 134). Some locations, notably wells MMW-20LA, MMW-21LA, MMW-P-22LA (Ref 122, pgs 91-96, 98-101, 105-109), MW-WES-01C (Ref 131, pg 1), and MW-WES-6D (Ref 132, pg 1) show vinyl chloride contamination below the first encountered fine-grained sediments (Ref 122, pgs 46-72; Ref 131; Ref 132).

Ref 120 (pgs 6, 8-9) shows that subsurface materials beneath the site, the Speedway wellfield, and the Riverside wellfield are part of one continuous sand and gravel outwash plain that extends across the White River and lower Eagle Creek stream valleys. The thickness and extent of the finer grained material in the project area are insufficient to form a barrier to vertical contaminant migration. The finer grained unit from 35-50 ft bgs is not present in parts of the project area (Ref 40, pgs 955-963, 986-997; Ref 133, pgs 557 and 559). There are no aquifer boundaries or discontinuities between the residential wells and the Riverside and Speedway wellfields (Ref 3).

In the project area, shale bedrock of the New Albany Formation (Ref 120, pg 10) is present between 70-80 feet bgs (Ref 122, pgs 108, 113, 117; Ref 131). The New Albany Formation is between 85-150 feet thick in the White River basin and and has low water yield (Ref 130, pgs 6 and 11). In the Speedway wellfield it is not a major ground water producing unit and is considered an aquitard (Ref 123, pg 10). The New Albany Shale is not present less than 2 miles east of the study area and unconsolidated materials sit directly on the carbonate Muskatatuck group (Fig 1-5: Ref 120, pg 10; Ref 116, pgs 51-55).

Bedrock in the Riverside wellfield is Devonian-aged Muskatatuck group consisting of crystalline limestone and lesser calcareous shales (Ref 120, pg 10). Prior to glaciation, the top of the bedrock surface was exposed to weathering and underwent karst development (Ref 130, pg 15). Within the wellfield, the outwash aquifer is directly on the bedrock, (Ref 129, pg 23), which is relict karst, therefore, “the limestone aquifer is hydraulically connected to the outwash sand and gravel aquifer” (Ref 129, p. 27). The “…carbonate rocks lying…immediately beneath the outwash have undergone extensive solution-channel development…” (Ref 127, p. 3). Possible

solution cavities and/or voids were identified in the test piezometers cored near RS-29 (Ref 128, pp. 6, 12, 18-20).

HYDROGEOLOGY

The potential sources Genuine Parts (GP) and Michigan Plaza (MP) and the target receptor wells are situated within the stream valley for Little and Big Eagle Creeks. The confluence of these creeks is approximately 5700 feet south where they form Eagle Creek and, south of W. North Street, Little Eagle Creek is functionally within Big Eagle Creek stream valley and ground water from the east flows regionally toward Big Eagle Creek and the confluence rather than individually into each stream (Ref 3; Ref 119, pgs 57-61; Ref 122, pgs 2-5; Ref 38, pgs 51-52)

Ground water in the project area is encountered between 14 and 18 feet bgs in monitoring wells (Ref 119, pgs 2-39; Ref 122, pgs 44-45). Ground water is unconfined, as evidenced by similar hydraulic heads in shallow and deep wells (Ref 119, pgs 2-39; Ref 122, pgs 7-45). Little Eagle Creek does not form a hydraulic barrier, as evidenced by contamination sourced north of the creek which underflows the stream (Ref 119, pgs 57-61).

The ground water flow direction in the project area is generally towards the south with some components of flow to the southeast and southwest (Ref 119, pgs 63-66, Ref 122; pgs 2-5; Ref 38, pgs 51-52), Regional ground water flow near the Speedway wellfield southeast from the Eagle Creek valley towards the White River valley (Ref 123, pg 12).

The stream channel of Big Eagle Creek within the lower valley has been rerouted over time. Review of historic aerial photographs from 1972, 1962, 1956, and 1941 (Ref 124) shows that Big Eagle Creek steam channel south of Vermont St, was originally much closer to what is now the intersection of Holt Road and Cossell Ave. The original stream channel implies that natural flow can be to the southwest as well as southeast.

The contaminated residential wells are between 41 and 75 feet deep (Ref 116, pgs 59-62). These are similar depths to the contaminated monitoring wells associated with the Genuine Parts and Michigan Plaza releases (Ref 119, pgs 2-61; Ref 122, pgs 7-43, 46-72).

In 2013, Mundell performed slug tests on seven wells near the residential wells. The hydraulic conductivity averaged 70.9 feet per day with a maximum of 141 feet per day (Ref 121, pg. 3).

Estimated aquifer transmissivity around the Speedway wells is between 70,000 and 100,000 GPD/ft (Ref 123, pg 41). Estimated aquifer transmissivity in the Riverside wellfield is 200,000 GPD/ft (Ref 129, pg 21).

The ground water system in the area of the Speedway wellfield consists of two aquifer layers, separated by a clay layer (aquitard) of varying thickness. Both aquifer layers in the valley sediments are hydraulically connected with adjacent sand and gravel layers in the glacial till beneath the uplands. (Ref 123, pg 12) The Speedway wellfield conceptual site model implies that the two aquifers are interconnected within the Eagle Creek valley (Ref 123,pg 40). The ground water in the Riverside wellfield is also connected to the study area.

Ref 120 (pgs 6, 8-9) shows that the sandy outwash extends up the Eagle Creek valley to the Speedway wells and eastward in to the White River valley to the Riverside wells. The wells in both wellfields are screened at similar depths and in similar geologic material as contaminated wells in the project area (Ref 116). There are no aquifer boundaries such as faults or mountain ranges between the project area and the Speedway or Riverside wellfields (Ref 3).

REFERENCES

Reference 3: U.S. Geological Survey, Indianapolis, Marion County, Indiana – Area Location Topographic Map. 1 page.

Reference 38: U.S. EPA, Technical Memorandum, Analytical and Hydrogeological Evaluation, January 30, 2013. 448 pages

Reference 40: Acuity Environmental Solutions, revised Remediation Work Plan, Michigan Plaza, December 31, 2014. 1596 pages.

Reference 116: Indiana Department of Natural Resources, Record Of Water Well, Various Dates. 62 pages.

Reference 119: Environ International Corporation, Remedial Progress Report, August 2014. 70 pages

Reference 120: Indiana Geological Survey, The Hydrogeologic Framework of Marion County, Indiana, 2000. 13 pages.

Reference 121: Mundell Consulting Professionals, Remediation Work Plan, September 18, 2013. 54 pages

Reference 122: Mundell Consulting Professionals, Quarterly Monitoring Progress Report, July 31, 2014. 72 pages.

Reference 123. HNTB, Phase 1 Wellhead Protection Plan, March 2001, 41 pages.

Reference 124: City of Indianapolis General Map Viewer historic aerial photographs from 1972, 1962, 1956, and 1941 (available at http://maps.indy.gov/MapIndy/)

Reference 125: U. S. Department of Agriculture, Natural Resources Conservation Service, soil survey of Marion County Indiana, 1978, 6 pages.

Reference 127: Indiana Department of Natural Resources, Geology for Environmental Planning in Marion County, Indiana, 1980. 4 pages.

Reference 128: Black & Veatch, Boring Logs, Various Dates, 2010. 26 pages

Reference 129: Wittman Hydro Planning Associates, Inc. And IWC Resources, Inc. WHPA, Riverside And Fall Creek Well Fields, Capture Zone Delineation, March, 2000. 273 pages.

Reference 130: U. S. Geological Survey, Hydrogeologic Atlas of Aquifers In Indiana, 1992, 22 pages.

Reference 131: Weston Solutions, Boring Well Logs, November, 2011. 5 pages

Reference 132: GEOLIS, Well Construction Form, 2014, 4 pages.

Reference 133: Keramida Final Remediation Work Plan, Former General Motors Corporation, Allison Gas Turbine Division, Plant 10, Indianapolis, Indiana, Volume 2, August 16, 2004. 613 pages